

REMARKS

The comments of the applicant below are each preceded by related comments of the examiner (in small, bold type).

Claims 53-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakata et al. (US 6276772) in view of Takamura et al. (US 200210033644).

Regarding to claim 53:

Sakata et al. discloses an apparatus comprising:

droplet ejection devices (*FIG. 1-2*) each comprising an element (*FIG. 1-2, element 1*) to change a volume of a fluid chamber (*FIG. 1-2, elements 3 and 6*) of one of the droplet ejection devices, the element having an electrical capacitance (*FIG. 5*); and

control circuitry to effect uniform velocities of droplets ejected from at least two different ones of the droplet ejection devices by providing respective charge voltages or charge currents to the volume changing elements to individually control a charge on each volume changing element (*Abstract*).

Sakata et al. however does not teach wherein droplet ejection device being associated with a plurality of charging resistors and the control circuitry provides the respective charge voltage or charge current by selecting a first charging resistor associated with the droplet ejection device to charge the electrical capacitance at a first rate followed by selecting a second charging resistor associated with the droplet ejection device to charge the electrical capacitance at a second rate before discharging the electrical capacitance.

Takamura et al. discloses an apparatus including a droplet ejection device (*FIG. 2*) being associated with a plurality of charging resistors (*Abstract and FIG. 11, elements 92-93; The resistors are impedances of transistors 92-93*), and a control circuitry provides the respective charge voltage or charge current by selecting a first charging resistor associated with the droplet ejection device to charge an electrical capacitance (*FIG. 11, element 91*) at a first rate followed by selecting a second charging resistor associated with the droplet ejection device to charge the electrical capacitance at a second rate before discharging the electrical capacitance (*FIG. 12d and 12f*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify Sakata's driving circuitry to include a plurality of resistors associated with an ejection device for charging the electrical capacitance at different rates as disclosed by Takamura et al. The motivation for doing so would have been to suppress the peak value of the induced voltage occurring in an electrode of the electrical capacitance when charging and discharging as taught by Takamura et al. (*paragraph [0018]*).

The Examiner contends that there is motivation to modify Sakata's driving circuitry to include a plurality of resistors for charging the electrical capacitance at

different rates as disclosed by Takamura because doing so would suppress the peak value of the induced voltage occurring in an electrode of the electrical capacitance when charging and discharging as taught by Takamura. However, Applicant notes that there is no need to suppress a peak value of an induced voltage in the apparatus of Sakata. Therefore, a person of ordinary skill in the art would not have combined Sakata with Takamura as suggested by the Examiner.

Takamura discloses an apparatus that drives both electrodes (57a and 57b) of the piezoelectric element 57. As shown in FIG. 3 of Takamura, there is induced voltage on the electrode 57B (corresponding to node OUTB) when the element 57 is charged or discharged by transistors 31, 32, 33, or 34 through the electrode 57A. There is also induced voltage on the electrode 57A (corresponding to node OUTA) when the element 57 is charged or discharged by transistors 44, 45, 46, or 47 through the electrode 57B. In Sakata, the charging and discharging of the piezoelectric element 1 is done only through one of the terminals, while the other terminal of the piezoelectric element 1 is connected to ground (see FIGS. 6A and 6B). The terminal connected to ground remains at ground voltage and does not have induced voltage. Therefore, in Sakata there is no need to suppress the peak value of the induced voltage, nor is there a need to use a high-impedance PMOS transistor and a low-impedance PMOS transistor (as taught in Takamura) for charging the piezoelectric element 1 at a first rate followed by charging the element 1 at a second rate. A person skilled in the art would not have modified the Sakata driving circuitry to use the two PMOS transistors of Takamura because doing so would make the driving circuitry more complicated without providing any apparent benefit.

Moreover, Sakata reduces variations in ejection speeds of different piezoelectric elements by adjusting the charging pulse peak voltage in a range between V_{min} to V_{max} , which is achieved by adjusting the pulse width of the charge pulse signal 17 in a range between W_{min} to W_{max} (see FIGS. 8A to 8C and col. 7, lines 1-23). Sakata does not describe and would not have made obvious that charging the piezoelectric element at a

first rate followed by charging the piezoelectric element at a second rate would be useful in reducing variations in ejection speeds of different piezoelectric elements.

All of the dependent claims are patentable for at least the same reasons as those applied to the claims on which they depend.

New claims 71 to 80 have been added. No new matter has been introduced. Support for claims 71 and 79 can be found in, e.g., FIG. 6 of the specification. Support for claims 72 and 80 can be found in, e.g., FIG. 7 of the specification.

Any circumstance in which the applicant has addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner. Any circumstance in which the applicant has made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims. Any circumstance in which the applicant has amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

Please apply \$130 for the Petition for Extension of Time fee and any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: January 29, 2009 _____

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